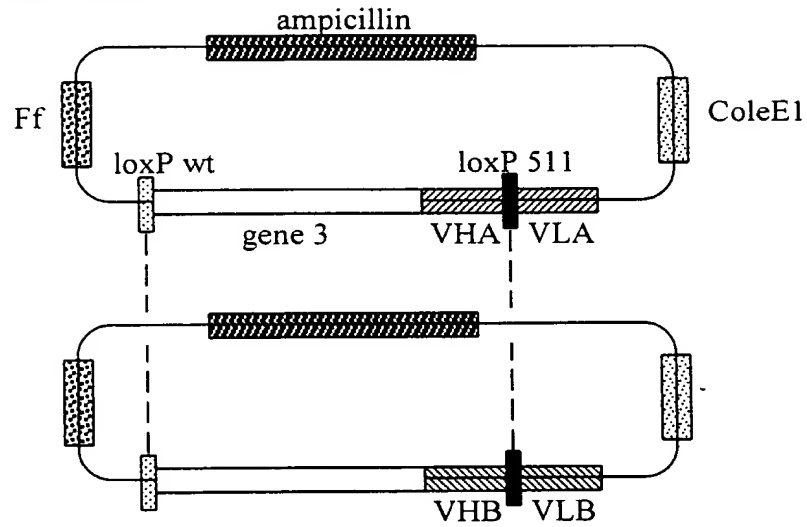


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Before recombination



After recombination

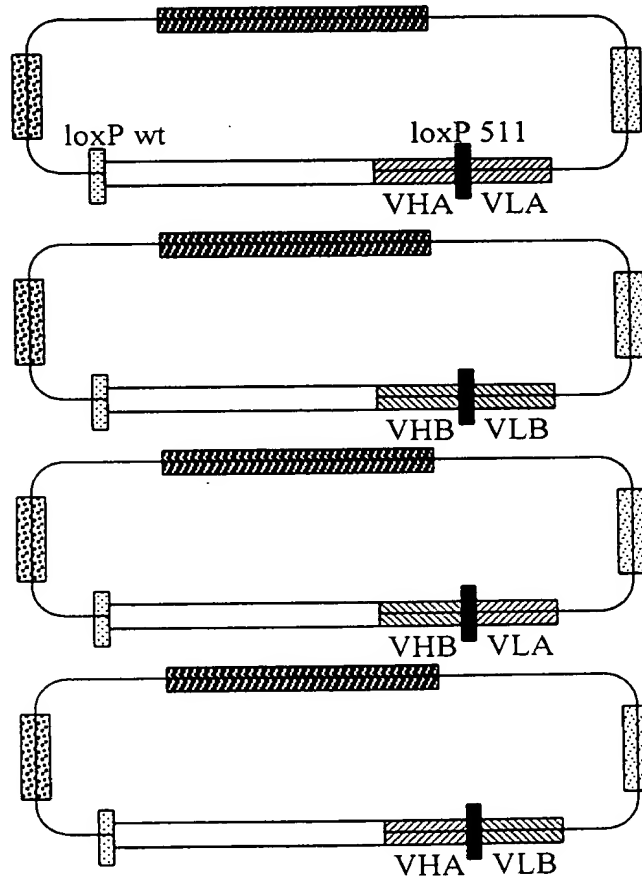


Fig. 1 All phagemids, before and after recombination, have functional antibodies

S G G S T I T S Y N V Y Y T K L S S S G T
TCCGGAGGTCGACC ATAACTTCGTATAATGTATACGAAAGTTAT CCTCGAGCGGTACC
 BspEI Sali lox511 XhoI KpnI

Fig. 2

AAGCTTGCCAAATCTATTCAAGGAGACAGTCATA
ATGAAATACCTATTCCTACGGCAGCGCTGGATTGTTATTACTCGCAGCAAGCGGCGCATGCC
 HindIII Shine Delgano
 BssHII

bacterial leader
 M K Y L L P T A A A G L L L A A S G A H A

S G G S T I T S Y N V Y Y T K L S S S G T
 ...VL chain...TCCGGAGGTCGACC ATAACTTCGTATAATGTATACGAAAGTTAT CCTCGAGCGGTACC....VH chain....
 BspEI Sali loxP 511 site XhoI KpnI

SV5 epitope tag His6
 A S G K P I P N P L L G L D S T H H H H H (Q)
GCTAGC GGCAAACCAATCCCAACCCACTGCTGGGCCTGGAT AGTACT CACCATCACCATCACCAT TAG
 NheI ScaI amber

gene 3' protein
 A A A T V E S C . . . R N K E S stop
CGGGCCGC TACTGTTGAAAGTTGT.....CGTAATAAGGAGTCT TAA GCATGC ATAACTTCGTATAATGTATACGAAAGTTAT
GAATTC
 NotI
 EcoRI loxP site

Fig. 3

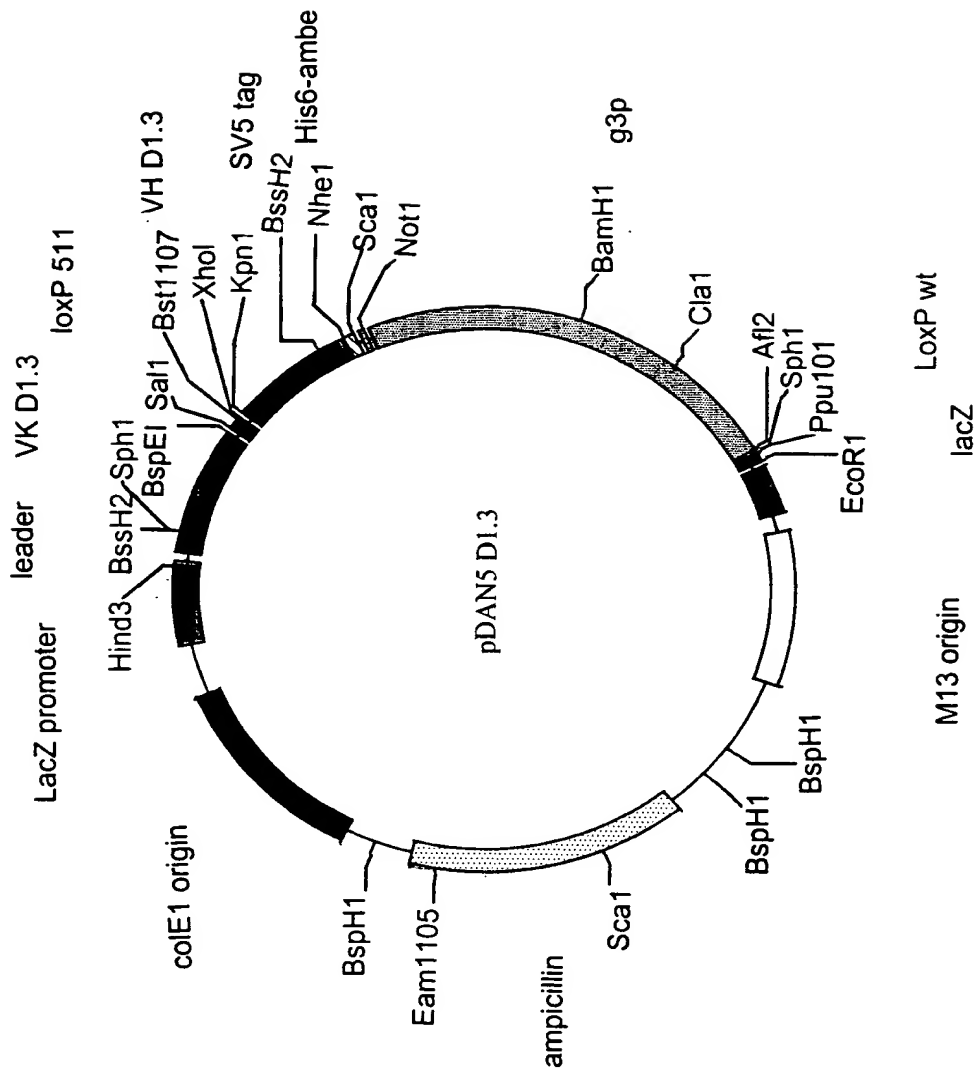


Fig. 4

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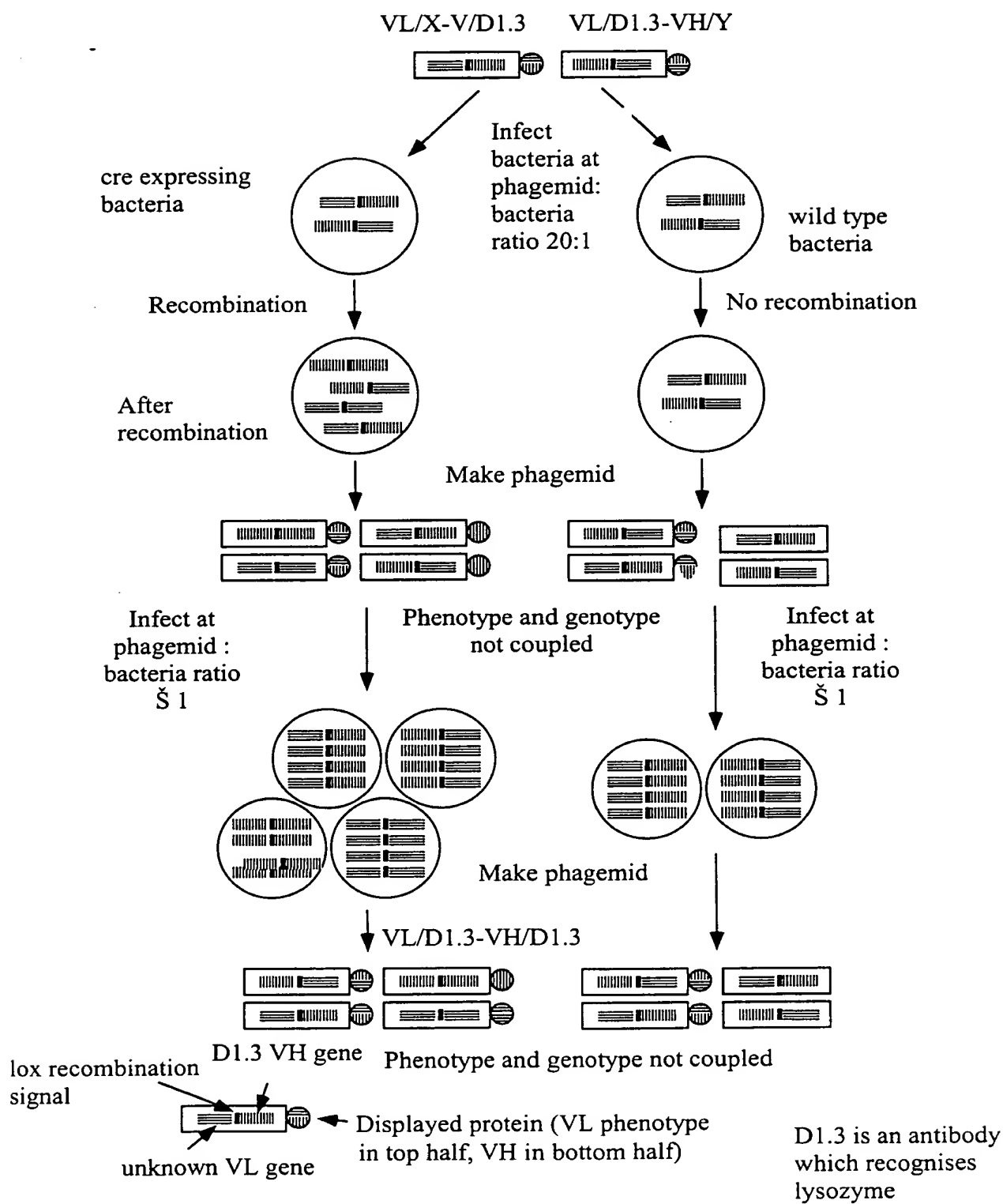


Fig.5

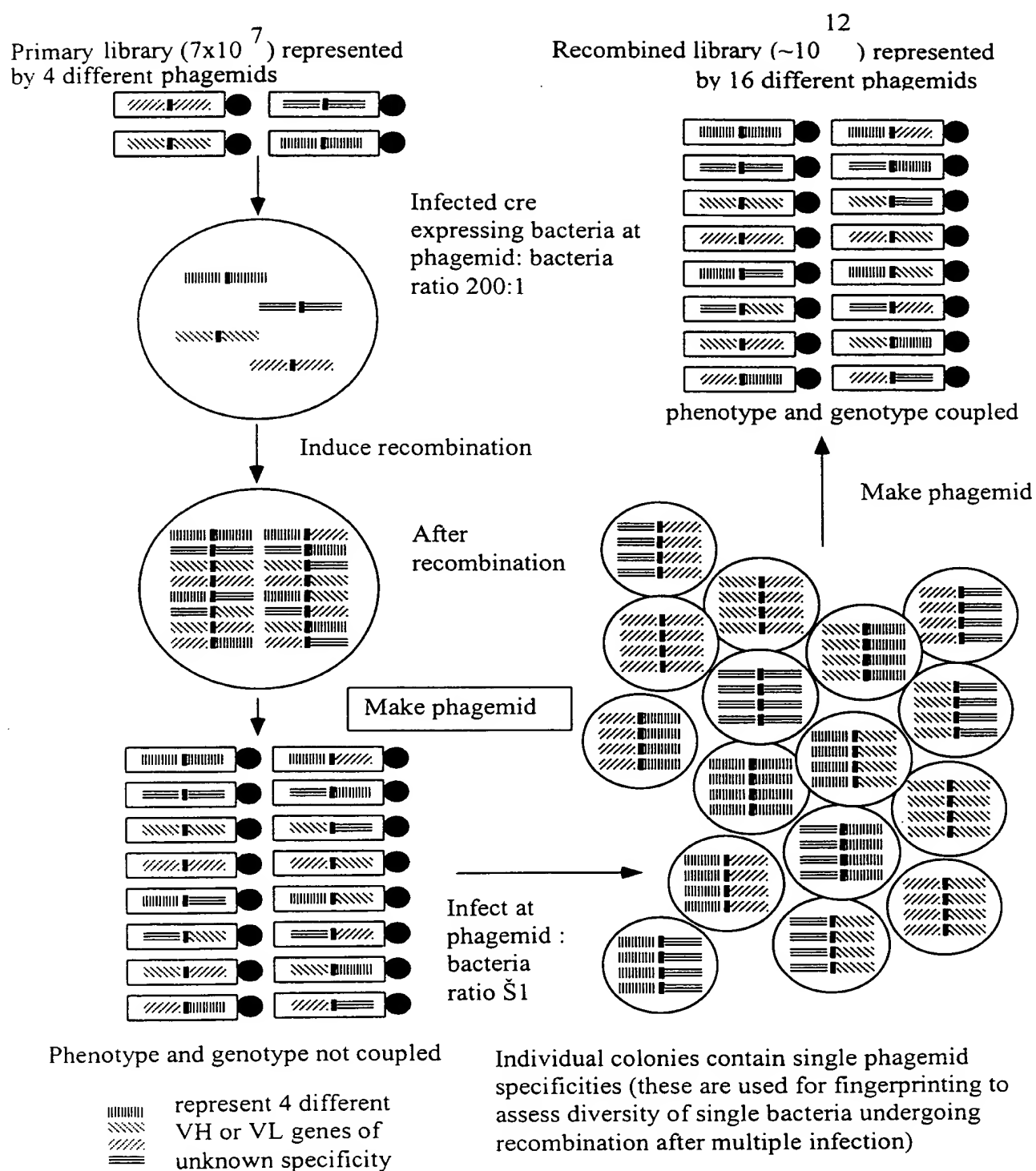
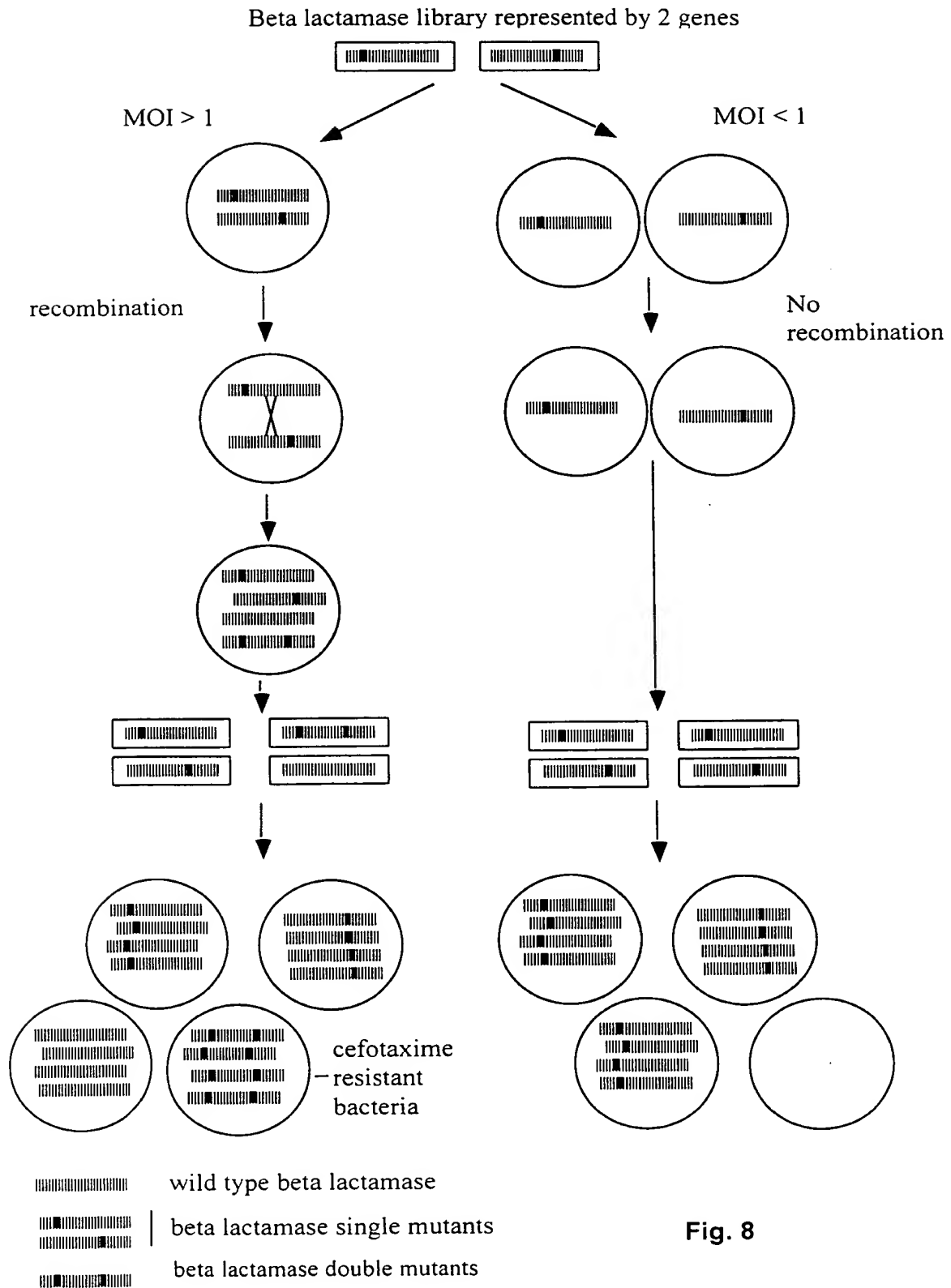


Fig. 6

| | | VH | | | | | | | | | | | | | | | | |
|----|----|----|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----|----|
| VL | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| | 1 | 1 | | | | | | | 1 | | | | | | | | | |
| | 2 | | | | | | | | 1 | | | | | | | | | |
| | 3 | | | 1 | | | | | | | | | | | | | | |
| | 4 | | | | 1 | | | | | | | 1 | | | | | | |
| | 5 | | | | | 1 | | | | | | | | | | | | |
| | 6 | | | | | | | | | | | | 1 | | | | | |
| | 7 | | | | | | | | | | | | 1 | | | | | |
| | 8 | | | | | | | | | | | | | | 1 | | | |
| | 9 | 2 | | 2 | | | | | | | | | | | | | | |
| | 10 | 3 | | | 1 | | | | | | 1 | | | | | | | |
| | 11 | 2 | 1 | | | 1 | | | | 1 | | | | | | | | |
| | 12 | 2 | | 1 | | 1 | 1 | 1 | | | | | 2 | | 1 | | 1 | 3 |

Fig. 7



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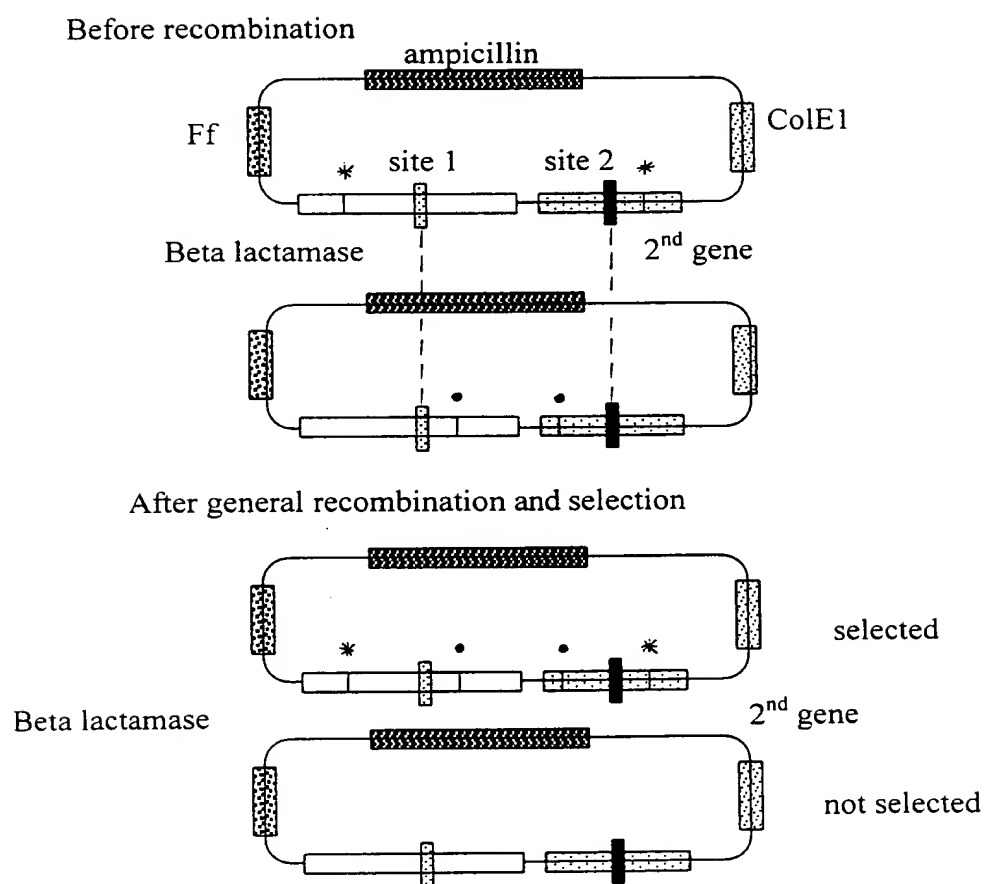


Fig. 9